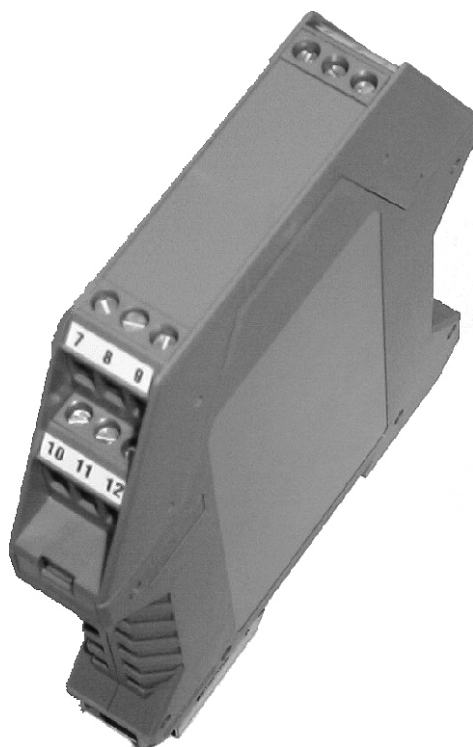

FT 9004

Frequency Divider For Inkremental Encoders

Instruction Manual



ERMA

Electronic GmbH

Warranty

For delivered products our "Allgemeine Lieferungs- und Zahlungsbedingungen" are effective. In no event we or our suppliers shall be liable for any other damages whatsoever (including, without limitation, damages for loss of business profits, business interruption or other pecuniary loss) arising out of or inability to use this product.

All our products are warranted against defective material and workmanship for a period of two (2) years from date of delivery. If it is necessary to return the product, the sender is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit. The warranty does not apply to defects resulting from action of the buyer, such as mishandling, improper interfacing, ope-

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1. Description

The converter **FT 9004** is a frequency divider in a snap-in housing for 35mm rail mounting. The unit is able to divide input frequencies respectively pulse chains of incremental encoders. The divider value is adjustable by the user. The unit can be used for input frequencies up to 90 kHz.

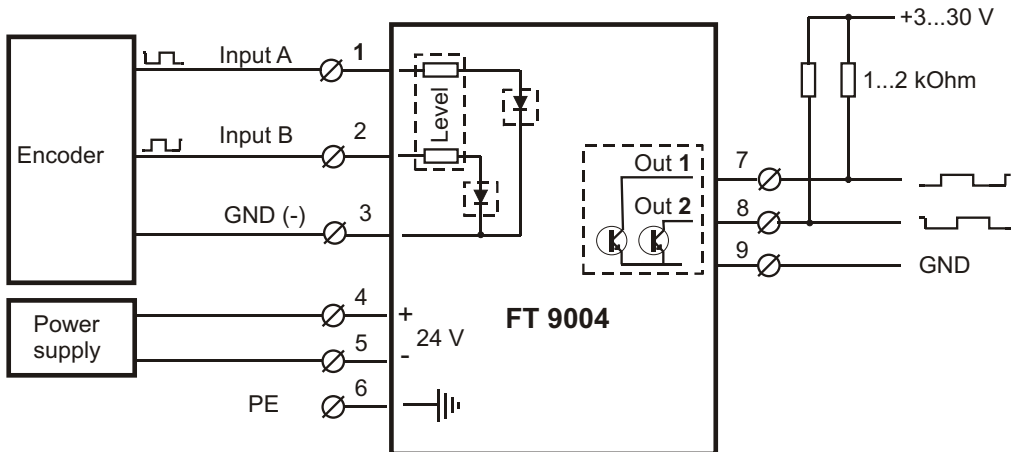
There are two operating modes. One mode is able to divide two input pulse chains 90° out of phase applied to the input channels "Input A" and "Input B". A second operating mode uses only input channel "A" for the input pulse chain. The other input channel "B" decides when using this mode the direction of the output pulse chains.

There are two open collector output channels "Out 1" and "Out 2". At both operating modes the output channels "Out 1" and "Out 2" are generating output pulse chains 90° out of phase, divided by the adjusted divider value.

The input channels "Input A" and "Input B" are opto isolated. Source signals of at least 5 mA are needed to drive the input channels. The input voltage level can be set by the user by internal jumpers to the desired input level of 5 V, 12V or 24 V.

The output channels are isolated from input channels as well as from the power supply input. The output channels consist of potential free collector-emitter paths. By that the customer can create an output level to his own requirements using two resistors and an external power supply.

The functional structure of the converter is shown in picture 1. There are two adjustable resistor networks for input voltage level adjustments, followed by opto coupler inputs, a frequency divider and the open collector outputs "1" and "2".



Picture 1

2. Safety Instructions

This instrument is produced in accordance with Class II of IEC 348 and VDE 0411. When delivered the instrument has been tested to meet all functions described. Before installing the instrument please read the mounting and servicing instructions. We have no liability or responsibility to customer or any other person or entity with respect to any liability, loss or damage caused or alleged to be caused directly or indirectly by equipment or software sold or furnished by us. Read the installation instruction carefully. No liability will be assumed for any damage caused by improper installation. Inspect the instrument module carton for obvious damage. Be sure there are no shipping and handling damages on the module before processing. Do not apply power to the instrument if it has damaged.

ERMA's warranty does not apply to defects resulting from action of buyer, such as mishandling, improper interfacing, operation outside of design limits, improper repair or unauthorized modifications.

2.1. Symbol Explanation



Caution



Attention



Instruction



Tip

Caution: Will be used at **dangerous for life and health !**.

Attention: Will cause **damage**

Instruction: If not noticed, **trouble** may occur

Tip: Useful hints for **better operation**

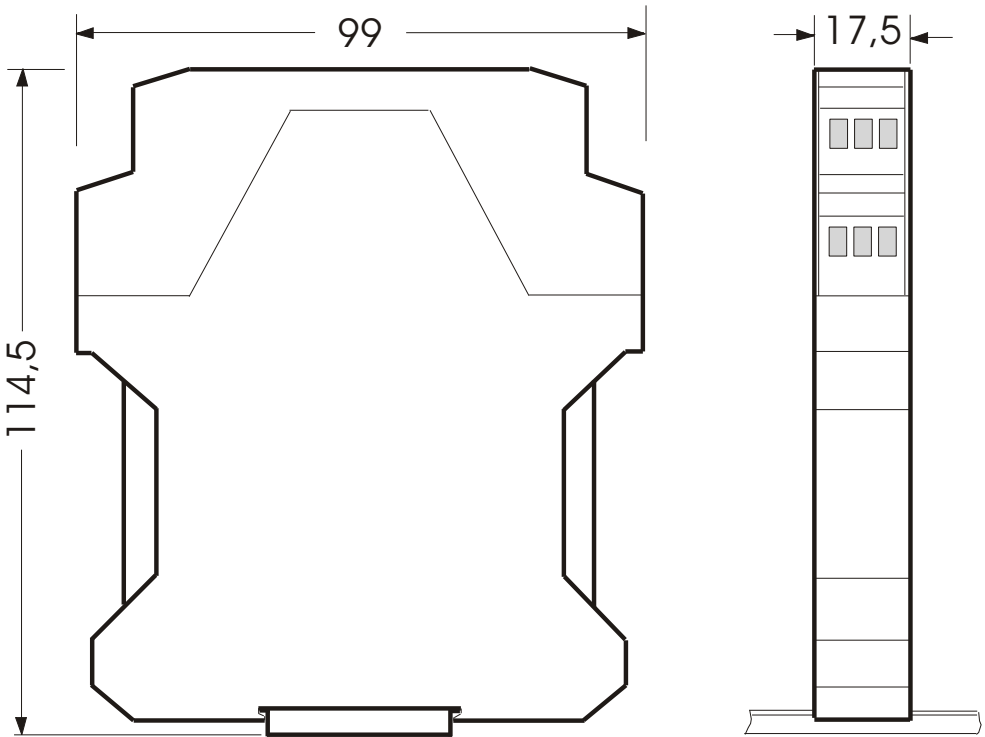
3. Mounting

3.1. Place Of Operation

Attention must be paid to the protection against humidity, dust and high temperatures at the place of operation.

3.2. Mounting Of The Signal Converter

- Through simple snap up at 35 mm rail (DIN EN 50022).



4. **Electrical Connections**

4.1. **General Instructions**



- It is forbidden to plug or unplug terminals with voltage applied.
- Attach input and output wires to terminals only without voltages applied.
- Cords must be provided with sleeves.
- Attention must be paid that the power supply voltage applied will agree with the voltage noticed at the name plate.
- The instrument has no power-on switch, so it will be in operation as soon as the power is connected.

4.2. **Hints Against Noisy Environment**

All inputs and outputs are protected against noisy environment and high voltage spikes. Nevertheless the location should be selected to ensure that no capacitive or inductive interference can have an effect on the instrument or connection lines.

It is advisable:

- To use shielded cables.
- The wiring of shields and ground (0V) should be star-shaped.
- The distance to interference sources should be as far as possible. If necessary, protective screen or metal enclosures must be provided.
- Coils of relays must be supplied with filters.
- Parallel wiring of input signals and AC power lines should be avoided.
- The parallel output lines must be as short as possible.
- It is necessary to use shielded twisted pair cable for the RS422-lines as well as for the SSI signal lines.



5. Function

The converter **FT 9004** is a frequency divider in a snap-in housing for 35mm rail mounting. The unit is designed for dividing pulse chains of incremental encoders by a predetermined value. The desired divider value is adjustable by the user. The unit can be used for input frequencies up to 90 kHz. Up-down counting is possible without loss of pulses.

There are two operating modes available. One mode is able to divide two input pulse chains 90° out of phase applied to the input channels "Input A" and "Input B". A second operating mode uses only input channel "Input A" for the input pulse chain. The other input channel "Input B" decides when using this mode the direction of the output pulse chains.

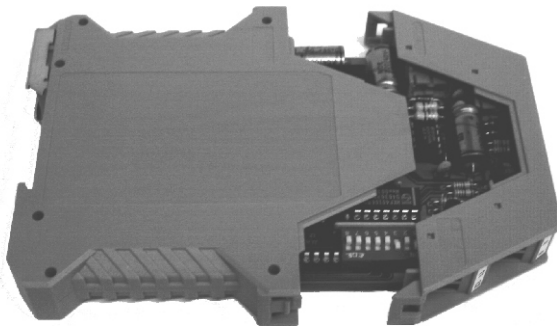
There are two open collector output channels "Out 1" and "Out 2". At both operating modes the output channels "Out 1" and "Out 2" are generating output pulse chains 90° out of phase, divided by the adjusted divider value.

The input channels are isolated. Source signals of at least 5 mA are needed to drive the input channels. The input voltage level can be set by the user by internal jumpers to input levels of 5 V, 12V and 24 V.

The output channels are isolated from the input channels and the power supply input. The output channels are provided as open collector outputs. So the user can create by resistances output voltages from 3 V to 30 V according to his requirements.

6. Jumper- and DIP-Switch Configurations

For adjustments there are three jumperblocks and two 8-pole DIP switches inside of the case. To access the jumperblocks and the DIP switches the case has to be opened. This is simple done with the aid of a small screwdriver. There are two little flat on each side of the case which must be pressed inwards. The top of the case can now be separated from the base and the PCB can be pulled out (pic.2).



Picture 2

Input Level Adjustment

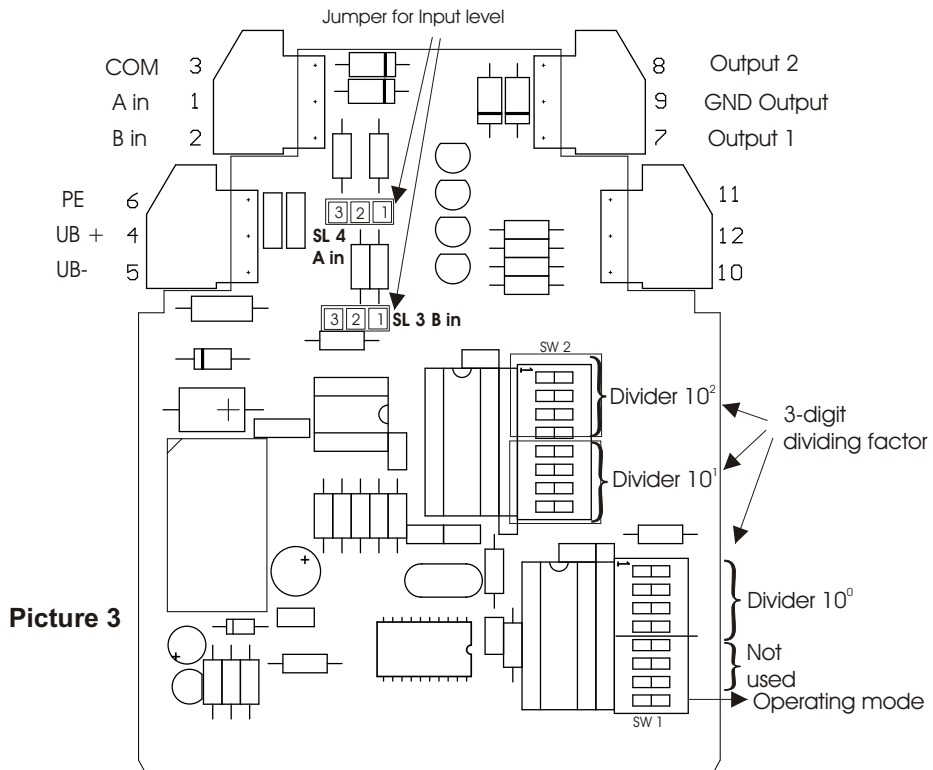
On the PCB there are two jumperblocks SL3 and SL4 for input level adjustments available. Each jumperblock consists of 3 pins. If the jumpers are left open input level voltage is 24 V. When connecting pin 2 with 3 input level voltage is 12 V and connecting pin 1 and 2 the input level voltage will be 5 V.

Adjustment of the operating mode

The operating mode can be selected by the switch "8" of the 8-pole DIP-switch SW 1. Position "OFF" of switch "8" requires two input pulse chains with 90° out of phase. If switch "8" is switched "ON", input channel "A" requires the pulse chain to be divided and input channel "B" decides the direction of the two output pulse chains.

Adjustment of the divider value

The adjusting of the divider value is done by the two 8-pole-DIP switches **SW1** and **SW2**. The adjustment range of the divider value is available from 2 to 999. For adjusting BCD-code must be applied. The switch assignment of the DIP switches SW1 and SW2 is shown in picture 3.



Picture 3

Example of adjusting the divider

An input frequency of 24960 Hz has to be divided. The desired output frequency shall be 195 Hz. The divider value "D" must be calculated:

$$D = 24960\text{Hz} / 195\text{Hz} = 128$$

Settings of DIP switch SW2

DIP-switch number	Value of the switch	Selected Position
1	800	OFF
2	400	OFF
3	200	OFF
4	100	ON
5	80	OFF
6	40	OFF
7	20	ON
8	10	OFF

Settings of DIP switch SW1

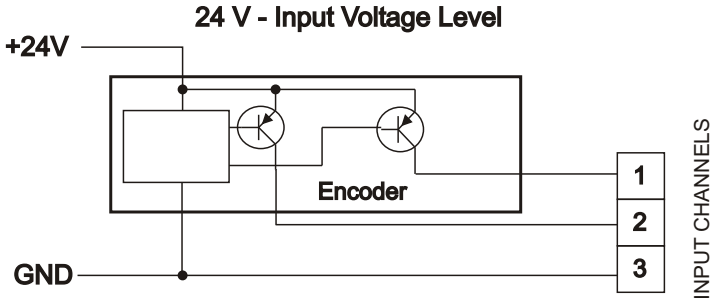
DIP-switch numberr	Value of the switch	Selected Position
1	8	ON
2	4	OFF
3	2	OFF
4	1	OFF

7. Connections and Pin Assignment

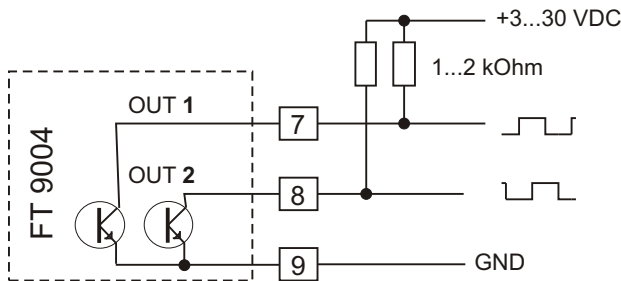
Screw terminal assignment:

1	Input Channel A	7	Output Channel 1
2	Input Channel B	8	Output Channel 2
3	Input Channels GND	9	Output GND
4	Power supply voltage DC (+)	10	nc
5	Power supply voltage DC (Gnd)	11	nc
6	Ground connection	12	nc

7.1. Connecting Input Signals



7.2. Connecting Output Signals



Important notes about the frequency output:

The output of the FT 9004 consists of a collector-emitter path, which must be externally wired accordingly.

The external voltage and the resistance must be chosen so that the equipment is operated within its specifications.

The following should be considered when dimensioning the load resistor:

- The higher should be the output frequency, the smaller the value of the load resistor must be chosen. When an external voltage of 24 VDC, the value of the load resistor 800 should - be 1000 ohms to still obtain a sufficiently high signal edge at the maximum output frequency of 25 kHz.

- the maximum allowable current for the collector-emitter path is 50 mA
- should there be problems with the output frequency, it is recommended to control the output signal with an oscilloscope and adjust the load resistor according to the specifications.

(see table on next page)

8. Startup Procedure

Data of optocoupleroutput:

max. voltage: 30 V

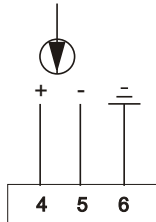
max. current : 50 mA

Isolationvoltage: 500 V

Table loadresistors

max. output frequency	max. load resistor
25 kHz	1 kOhm
20 kHz	1 kOhm
15 kHz	1,5 kOhm
10 kHz	3 kOhm
5 kHz	6 kOhm
1 kHz	>6 kOhm

7.3. Power Supply



8. Startup Procedure

t Attention must be paid that power supply voltage applied will agree with the voltage noticed at the name plate.



When delivered, the instrument is adjusted with a standard configuration (default value of the divider = 1). By changing the adjustment the customer can alter the standard configuration according to his measuring task.



Attention ! When the instrument is built in a machine and the customer wants to change the configuration, attention must be paid, that no damage will occur to the machine!

9. Handling Of Misfunctions

All devices of ERMA-Electronic GmbH are tested for perfect function during production as well as when delivered. Nevertheless it is possible that a device won't work. That is not always a reason by the new device. There are many small reasons that will result in misfunctions. If the FT 9004 won't work properly, please check the following points.

- Look for proper supply voltage
- Look for proper wiring of supply
- Look for proper configuration of the divider value
- Look if high voltage spikes are existing and have an influence to the device.

If all tests are all right, the device must be send back for controlling.

10. Technical Datas

10.1. Electrical Datas

Input Channels A and B

Voltage Level	: 5, 12 or 24 V DC (optional 48 VDC)
Tolerance	: +/- 20%
Max. Frequency	: 90 kHz
Input current	: ≥ 5 mA.
Isolation voltage	: 500 V

Divider Value Adjustment

3 Decade	: 2 ... 999
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Output Channel 1 and 2

Max. voltage (open collector)	: 30 V
Max. current	: 50 mA
Max. frequency	: 25 kHz
Isolation voltage	: 500 V

Supply Voltage DC

	: see ordering information
Power consumption	: max. 40 mA (24 V DC)
Isolation voltage	: 500 V / 1 min

10.2. Mechanical Datas

Case

	: EN 50022 (DIN rail mounting)
Dimensions (W x H x D)	: 114.5 x 99 x 17.5 mm
Weight	: appr. 100 g
Connections	: 12 screw terminals
Protection	: IP 40

10.3. Environmental Conditions

Operating temperature	: -5 .. 50 °C
Storage temperature	: -20 .. 70 °C
Humidity	: < 80 %, not-condensing
SProtection	: class II
Field of application	: class 2
	: overvoltage protection II
CE	: in conform with 89/336/EWG
	: NSR 73/23/EWG

11. Ordering Information

FT 9004 -			
			Special model
			0 no special model
			1 reserved
			Input voltage
			0 Standard
			1 48 V
			2 reserved
			3 reserved
			Power Supply
			0 4,5 ... 9 V DC, (option)
			1 9 ... 18 V DC, (option)
			2 18 ...36 V DC, (standard)
			3 36 ... 48 V DC, (option)

ERMA - Electronic GmbH
Max-Eyth-Str. 8
D-78194 Immendingen

Telefon (+49 7462) 2000-0
Fax (+49 7462) 2000-29
email info@erma-electronic.com
Web www.erma-electronic.com

